

Description

SYSTEM AND METHOD FOR REMOVING ROOF MATERIAL

CROSS REFERENCE TO RELATED APPLICATIONS

[0001] This application claims priority from United States provisional patent application Ser. No. 60/319,827, filed on December 31, 2002, the disclosure of which is hereby incorporated herein by reference in its entirety.

BACKGROUND OF INVENTION

[0002] The present invention is directed to a system and method for removal of roof material. Although the invention is especially adapted for the removal of roof shingles, such as asbestos shingles, it may be used to remove other types of roof materials, such as cedar shakes, membrane roofing systems, and the like.

[0003] Even though various devices have been proposed, the common technique for removing roof materials is manual labor. The user utilizes a pry bar, or the like, to pry off a section of shingles and throws the shingles over the side

of the roof to the ground. From there, the shingles are deposited into a dumpster. This is a relatively slow and dangerous operation and leaves roofing nails in the homeowner's yard. Moreover, the roofing material is deposited in a landfill where it accumulates along with other discarded materials.

BRIEF DESCRIPTION OF DRAWINGS

- [0004] Fig. 1 is a side elevation of a roof material removing apparatus, according to the invention;
- [0005] Fig. 2 is a top plan view of the apparatus in Fig. 1;
- [0006] Fig. 3 is a detailed drawing of a tong assembly;
- [0007] Fig. 4 is a side elevation of the tong assembly in Fig. 3;
- [0008] Fig. 5 is a side elevation of a saw assembly, according to the invention;
- [0009] Fig. 6 is a front elevation of the saw assembly;
- [0010] Fig. 7 is a side elevation of a saw guard;
- [0011] Fig. 8 is a top plan view of the saw guard in Fig. 7;
- [0012] Fig. 9 is a further view of the saw guard in Fig. 8;
- [0013] Fig. 10 is a side elevation of a shredder blade assembly;
- [0014] Fig. 11 is a side elevation of another shredder blade as-

sembly;

- [0015] Fig. 12 is the same view as Fig. 1 of an alternative embodiment thereof;
- [0016] Fig. 13 is a side elevation of a spring bolt; and
- [0017] Fig. 14 is a side elevation of discharge duct.

DESCRIPTION OF THE PREFERRED EMBODIMENT

- [0018] Referring now specifically to the drawings, and the illustrative embodiments depicted therein, a roof material removal apparatus 10 includes a set of flexible lifting tines 12 and a carriage 14 to guide the tines along a roof (Fig. 1). The tines 12 are moved toward and away from the roof. This may be accomplished by providing a set of wheels 16, one of which is out of round, preferably the wheel closest to the set of tines. In the illustrative embodiment, the front wheel 16 is made in a hexagonal shape, although other shapes may be possible. The rear wheels may be used to steer the machine. In the illustrative embodiment, the front wheels propel the carriage, although this may be accomplished by the rear wheels. Alternatively, tines 12 may be moved toward and away from the roof by an actuator, such as by mechanical linkage or by an electromagnetic actuator in order to move the tines up

and down. In order to provide flexibility, tines 12 may be attached to carriage 14 by spring-loaded bolts 18. Carriage 14 includes a prime mover 20, which may be in the form of an electrical motor or a gas engine, such as a two-stroke engine. A gear box 22 may be provided in order to convert the output of prime mover 20 to the appropriate ratio for driving wheel 16. A conveyor 24 may be provided in order to convey roof material loosened by tines 12 upwardly. The roof material may then be diverted by a diverter 26 toward one side or the other of carriage 14. Diverter 26 may also function as a guiding handle.

Tines 12 may be bent downwardly, as illustrated in Fig. 4, in order to further lift the roof material upwardly as carriage 14 is moved forward. Tines 12 may be made of a strong resilient material, such as stainless steel, or the like. A tip 28 of the tines may be rounded.

- [0019] A saw 30 may be provided in order to sever the roof material into a series of sections of roof material. Saw 30 is adapted to be operated on a roof. To that extent, a handle portion 32 may be provided in order to allow an operator to stand up while operating the saw portion 34. Saw portion 34 is illustrated as a circular saw of the type that is well known in the art. However, reciprocating saws, or

other types of saws, may be utilized. Circular saw 34 includes a circular saw blade 36 having a carbide tip or a diamond pointed tip and driven by a motor 35. This makes the saw blade more resistant to damage by roofing nails. The saw blade may be coated with an anti-stick material, such as Teflon™, to reduce adherence of roofing material. A base plate 38 supports the saw and an adjustment mechanism (not shown) may be provided in order to adjust the depth of the cut made by the saw portion 34 in order to ensure that a cut is made substantially through the roofing material with little or no damage to the sub-roof. Handle portion 32 may include a grip 40 and an operating switch 42.

- [0020] Saw 30 may include a guard 44 in order to provide personal safety as well as an actuator 46 in order to retract the guard as is known in the art. Guard 44 may have a cleanout slot 46, which is especially used for asbestos shingles which tend to adhere to surfaces to allow excess material to be removed from saw blade 36. Thus, a tool and/or a solvent, such as kerosene, can be inserted into opening 46 in order to clean saw blade 36. A removable cover 48 may be provided over opening 46.

- [0021] In an alternative embodiment, an apparatus 10' includes a

carriage 14' with wheels 16 and tines 12 connected by bolts 18 to the carriage. Conveyor 24 elevates the roof material into a shredder 50. Shredder 50 shreds the roof material and deposits the material into a hopper 52. The various functions have separate controls located on the operator handle, which enable the operator to engage one or more of the functions, as desired. Shredder 50 may be a single-stage shredder or, where appropriate, a multiple-stage shredder. As illustrated in Figs. 10 and 11, shredder 50 is made up of synchronized shredder blade assemblies 66a, 66b that are each rotatable about respective axles 68a, 68b. Each blade assembly is made up of a series of curved blades 70a, 70b, which are assembled in the fashion of a rotary grass mower and intertwine with each other as the blade assemblies are mutually rotated by a gear or belt connection with prime mover 20 or by a separate electric motor. Blade 70a, 70b may be coated with an anti-stick surface, such as Teflon™, to resist adherence by the roofing material. While one set of blade assemblies are illustrated, shredder 50 may be made up of another set of blade assemblies arranged perpendicular to assemblies 70a, 70b. This provides a crosscut action on the roofing material. Hopper 52 may be lined with an anti-

stick liner, such as Teflon™, or other such known anti-stick liner.

- [0022] A magnet 54 may be provided in the hopper in order to attract nails, thereby separating the nails from the shredded roofing material. A cover 56 may be provided to provide access to the internal portion of hopper 52 for cleaning, or the like. A discharge duct 58 discharges the shredded roofing material beyond carriage 14'. Discharge duct 58 may be operated by an air compressor 60 and may be provided with a valve 62 which, when opened, allows roof material to be discharged and, when closed, allows a buildup of pressure from an air injection nozzle 64. Once discharged from duct 58, the material falls by gravity off the roof.
- [0023] Saw assembly 30 may be combined with apparatus 10'. Saw portion 34 may be mounted on retractable supports 70 so that the function of cutting the roof material into sections and removing the sections may be combined into a single step. Saw blade 36 would be attached to each side of, and in front of, lifting tines 12. In this configuration, the saw will move with the carriage. The saws can be driven from the prime mover by appropriate pulleys, gears, or, independently, by electric motors. Shredded

roof material discharged by discharge duct 58 may be conveyed, such as through a flexible hose, to a receptacle where it may be used for recycling, such as into paving material, or the like.

[0024] Apparatus 10 may be guided by a handle. Alternatively, the apparatus 10 may be remote-controlled, such as by an individual on the ground. In order to effect such remote control, a camera 66 may be positioned to view the area forward of the apparatus. One advantage of remote control is that it removes the operator from the roof environment. Also, an assembly may be provided to lift the apparatus to the roof. This may be in the form of a ramp (not shown) which may be foldable and which may be leaned against the roof. For especially steep roofs, a safety guide assembly may be used to anchor the assembly to the roof, such as a cable extending over the peak of the roof and attached to the opposite side of the roof in order to ensure that the assembly is retained on the roof.

[0025] Changes and modifications in the specifically described embodiments can be carried out without departing from the principles of the invention which is intended to be limited only by the scope of the appended claims, as in-

terpreted according to the principles of patent law including the doctrine of equivalents.